Part 107 Unmanned Aerial System (UAS) Requirements and Transportation Mapping Project Applications

Mike Maluda

Quick Summary of Part 107:
The FAA released Part 107 on Tuesday, June 21st. 2016. Part 107 provides for individuals to obtain their "Remote Pilot Certificate."

Part 107 will provide a certificate as well as operating rules for drone operators who do not fall into Section 336, 333 and COA to operate their aircraft in the national airspace.

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The new FAA Part 107 has made it easier to Fly sUAS Legally in the USA.

When did Part 107 go into effect?

August 29, 2016.

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The Remote Pilot in Command (PIC) is directly responsible for and is the final authority as to the operation of the sUAS.

An sUAS operation may involve a Individual or a team of crew members. These sUAS crew roles include:

Remote PIC – a person who holds a current **remote pilot certificate** with an sUAS rating and has the **Ultimate Final Authority and Responsibility** for the operation and safety of the sUAS.

How to Obtain UAG (UAS) Certification Part 107

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IF YOU DO NOT HAVE A PILOT'S LICENSE

To be certified as a UAG pilot ensure you meet the following requirements:

❖ You are at least 16 years old

❖ You can read, speak, write, and understand English (excepting a disability, such as hearing impairment)

❖ Your physical and mental condition allows you to safely operate a UAV

❖ Pass the initial aeronautical knowledge test (AKT) at an FAA-approved knowledge testing center

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Schedule an appointment with FAA-approved Knowledge Testing Center

➢ **Locate the nearest testing centers in your area.**

❖ [Search for an FAA drone test center near you](#)

❖ [Unmanned Aircraft Systems (UAS) Drone Knowledge Test](#)

❖ [Part 107 FAA Knowledge Testing Centers](#)

Airman Knowledge Testing Center List
Updated May 15, 2017

This is an updated list of Commercial testing center locations and contact information. This list replaces all previous versions. Applicants may contact the following central registration numbers for additional information:

Computer Assisted Testing Service (CATS) 1-800-947-4228

PSI / LaserGrade Computer Testing 1-800-211-2753

Make the call!!

Airman Knowledge Testing

The NEW Small UAS (Drone) Rule (Part 107), including all pilot and operating rules, is effective on August 29. Call PSI at 1-800-211-2754 to begin making your reservations

PSI is authorized by the Federal Aviation Administration (FAA) to administer the Airman Knowledge test as an Organization Designation Authorization (ODA). PSI has a large network of authorized testing sites offering convinient locations for applicants throughout the United States.

Exam Registration: (844) 704-1487 (Toll Free)

psi CATS
a psi business

Home   Find a CATS   Test Center   FAA Exam   FCC Exams   About   Contact
         Test Center   Application   Candidate
                                       Center

ACCOMMODATIONS FOR TEST-TAKERS WITH DISABILITIES

Unmanned Aircraft Systems (UAS) Drone Knowledge Test

Live agent registration is now open!
CALL (844) 704-1487 (Toll Free)

Drone Knowledge Test Information

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During the registration you
have to provide your particulars

- ❖ Name
- ❖ Date of Birth
- ❖ Physical Address
- ❖ e-mail address
- ❖ Telephone Numbers
- ❖ US$150.00

You will receive your Registration Confirmation shortly thereafter.

From: confirmreg@lasergrade.com
Sent: Tuesday, October 18, 2016 10:30 AM
To:
Subject: Registration Confirmation for   (MAU 3267)

KNOWLEDGE EXAM CONFIRMATION and PROFILE

Thank you for choosing PSI as your test provider. We are pleased to confirm the following information
regarding the knowledge test you have requested:

Date of Registration: October 18, 2016
PSI Locator #: MAU97267

Candidate Information:

Test Name: Unmanned Aircraft - General
Test Date: WED 11-09-16
Test Time: 10-16:00
Test Location: FL. Aviation Center - Tallahassee
                  3244 Capital Circle SW
                  Tallahassee Regional Airport

Click on the link below for a map of the testing centers location or copy and paste the link into your
web browser.

http://maps.yahoo.com/py/maps.py?addr=3244+Capital+Circle+SW&csz=Tallahassee+FL+32310

Test Site Telephone: 850-778-3591

The $ 150 fee for this exam has been charged to credit card number
XXXXXXXXXX

Registration   Confirmation

After you registered and know the date of your UAG (sUAS) Certification Test study like hell .

Test Site Telephone: 850-778-3591

The $ 150 fee for this exam has been charged to credit card number XXXXXXXXX
For your privacy, we have printed some of the numbers as Xs.

Please bring with you to the Testing Center:
   - THIS CONFIRMATION LETTER.
   - VALID current photo identification that includes, a signature, date of birth and current physical
   residential address (PO Boxes are not permitted).
         More than one form of identification may be used,
          but you MUST provide items to prove all four items.

ITEMS TO BRING TO TESTING CENTER
GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

Acceptable Forms of Identification:

ALL   Applicants

Identification information must be
- ❖ Valid
- ❖ Current

Identification must include the applicant's
- ❖ Photo
- ❖ Date of Birth
- ❖ Signature
- ❖ Physical and residential Address

GENERAL REQUIREMENTS

Acceptable Forms of Identification:

U.S. Citizens & Resident Aliens
- ❖ Driver permit or license issued by a U.S. state or territory
- ❖ U.S. Government identification Card
- ❖ U.S. Military identification card
- ❖ Alien residency card

GENERAL REQUIREMENTS

Acceptable Forms of Identification:

Non-U.S. Citizens
- ❖ Passport AND
- ❖ Driver permit or license issued by a U.S. state or territory OR Identification card issued by any government entity

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You will received your grade after the test and if you pass you will be presented with a

Temporary Airman Certificate

Congratulations !! But you are not done yet.

What happens if I fail the FAA's aeronautical knowledge test?

You may not retake the knowledge test for 14 calendar days from the date of the previous attempt, so use that time to relax and refresh on the parts you are unsure of. After two weeks, you can retest. You don't even have to tell your teachers what happened — no instructor endorsement or other form of written authorization is required to retest. You have to register again and pay another US$150.00.

Wanna Get Away…..

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Integrated Airman Certification and Rating Application (IACRA)

Create Username and Password and Register

Federal Aviation Administration

- → Home
- → What's new in IACRA
- → Frequently Asked Questions
- → Aircraft Search
- → Site Feedback
- → Contact Us
- → Training and Documentation
- → Helpful FAA Links
- → Available Certifications and Ratings

IACRA

Integrated Airman Certification and Rating Application (IACRA)

IACRA is the web-based certification/rating application that guides the user through the FAA's airman application process. IACRA helps ensure applicants meet regulatory and policy requirements through the use of extensive data validation. It also uses electronic signatures to protect the information's integrity, eliminates paper forms, and prints temporary certificates.

Username:

Password:

Forgot Username or Password?

Login   or Register

FAA Employee Login   Help

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Federal Aviation Administration

IACRA - Select Role(s)

Please select the role or roles below for which you would like to register.

Applicant

☐ Applicant

Instructors

☐ Air Carrier Flight Instructor — (CFR 121, 135)
☐ Chief / Assistant Chief Flight Instructor — (CFR 141)
☐ 142 Recommending Instructor — (CFR 142)
☐ Recommending Instructor — (CFR 61, 65, 141, SIC, Student, Remote, Flight Review)

Certifying Officers

☐ Aircrew Program Designee — (CFR 121, 135)
☐ Airman Certification Representative — (CFR 141)
☐ Airman Certification Representative (FIRC only) — (FIRC)
☐ Aviation Safety Inspector — (FAA)
☐ Aviation Safety Technician — (FAA)
☐ Designated Examiner — (CFR 61, 141, 65)
☐ Training Center Evaluator — (CFR 142, 121, 135)

Admin

☐ School Administrator — (CFR 141, 142, 121, 135)

Terms of Service (TOS)

You are accessing a U.S. Government information system, which includes (1) this computer, (2) this computer network, (3) all computers connected to this network, and (4) all devices and storage media attached to this network or to a computer on this network. This information system is provided for U.S. Government-authorized use only.

Unauthorized or improper use of this system may result in disciplinary action, as well as civil and criminal penalties.

By using this information system, you understand and consent to the following:

1. You have no reasonable expectation of privacy regarding any communications or information transiting or stored on this information system. At any time, the government may for any lawful government purpose monitor, intercept, search, and seize any communication or information transiting or stored on this information system.
2. Any communications or information transiting or stored on this information system may be disclosed or used for any lawful government purpose.

[Agree to TOS and Continue >>]

Readers & Viewers

Web Policies
Web Policies & Notices
Privacy Policy

Government Sites
DOT.gov
USA.gov
Recovery.gov
Regulations.gov
Data.gov

Applicant

☐ Applicant

CHECK THIS BOX

CLICK HERE TO AGREE

Agree to TOS and Continue >>

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Federal Aviation Administration

IACRA - User Profile Information

Application ID: 1316615

ISSUANCE ☐ A REISSUANCE OF THIS | DATE OF SUPERSEDED AIRMAN CERTIFICATE
INISTRATOR | EXAMINER'S DESIGNATION NO. OR INSPECTOR'S REG NO.
X. SIGNATURE OF EXAMINER OR INSPECTOR MANAGER, AIRMEN CERTIFICATION BRANCH | DATE DESIGNATION EXPIRES
IACRA E-SIGNED APPLICATION
EVIOUS EDITION | IACRA Equivalent

Navigation:
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- Frequently Asked Questions
- Aircraft Search
- Site Feedback
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- Training and Documentation
- Helpful FAA Links
- Available Certifications and Ratings

Certificate Information

Airman Certificate Number [ ] ❓

Date of Issuance [mm/dd/yyyy]

Personal Information

Please Note: The total length of your first and middle names must be less than 50 characters.

First Name [ ] ❓ ☐ No First Name
Middle Name [ ] ❓ ☐ No Middle Name
Last Name [ ]
Name Suffix [▼]
SSN ○ Social Security Number [ ] ❓
○ None
○ Do Not Use
Date of Birth [mm/dd/yyyy]
Sex ○ Male ○ Female
Hair Color [▼]
Eye Color [▼]
Weight (lbs.) [ ] ❓
Height (inches) [ ] ❓
Phone [ ] ❓
Email Address [ ] ❓

Citizenship

Citizenship Country [▼]

Place of Birth

City of Birth [ ] ❓
County of Birth [ ]
Country of Birth [▼]
State of Birth [▼]

Validate Residential Address ❓

Residential Address ❓

Address Line 1 [ ] ❓
Address Line 2 [ ]
Map or Directions to Physical Residential Address [ ] ❓
City [ ]
State [▼]
ZIP Code [ ]
Country [▼]

☐ Check here if your Mailing Address is different from your Residential Address and you are using the 8710.
☐ Check here if your Special Mailing Address is different from your Residential Address or Mailing Address.

Security Questions

Security Question 1 [▼] ❓
Answer [ ]
Security Question 2 [▼] ❓
Answer [ ]

User Name / Password

Create Your Unique IACRA Login
User Name [ ] ❓
Password [ ] ❓
Confirm Password [ ]
Your Unique IACRA Login
User Name

[Cancel] [Register]

Complete the Form and Click to Register

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By Expeal on June 22, 2016.

Criminal Background Checks Required To Fly Drones

Want to fly a drone? Better hope you have a clean criminal background.

The FAA will defer to the Transportation Safety Administration in order to vet people who request Remote Pilot Certificates.

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The TSA/FAA vetting process will take two to three weeks. If everything works out, your Remote Pilot Certificate will be mailed to. You are now certified to fly UAS under Part 107.
However …..
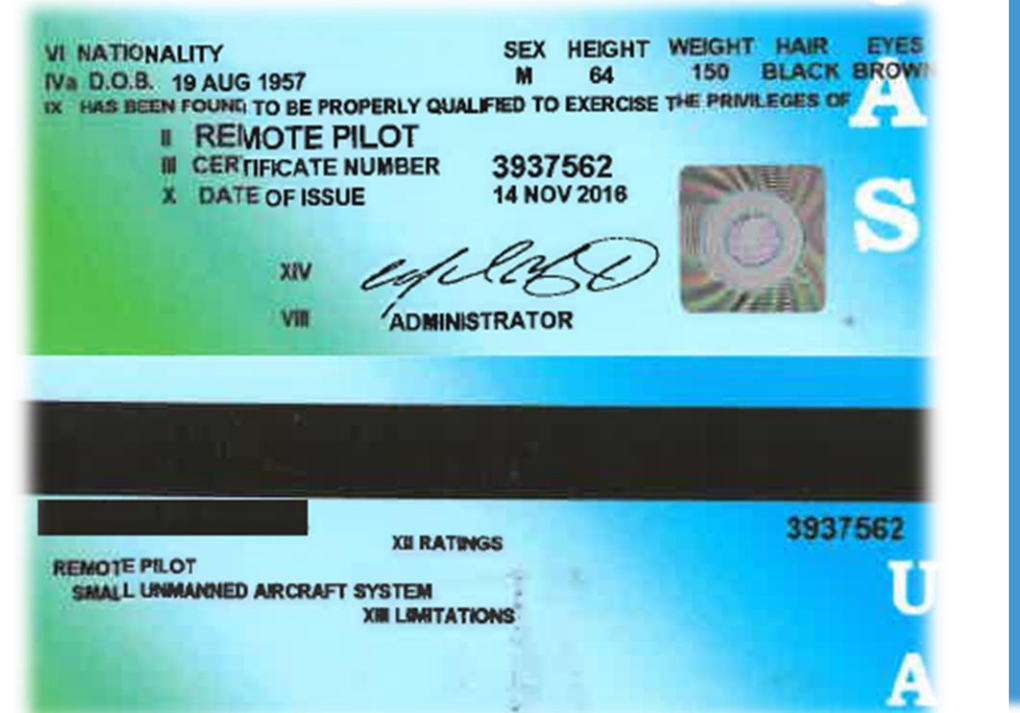
Culture of Safety & Responsibility

CAVEAT

Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect.
------ Captain A. G. Lamplugh

Why Do We Care About Safety & Responsibility?
... Because Pilots, Systems, People
Do Fail

Five Aspect of sUAS Safety/ Responsibility

➢ **P3CE**
  - ❖ **People**
  - ❖ **Property**
  - ❖ **Perception**
  - ❖ **Components**
  - ❖ **Environment**

The National Airspace

Why you need to be
safe when using your quadcopter,
hexcopter, octocopter, or other drone.

Join a Growing Industry

According to a study by the Association for Unmanned Vehicle Systems International, more than 100,000 drone and unmanned aerial systems jobs are projected by 2025. Degree holders work in a number of industries including military, government, energy, transportation, telecommunications and even entertainment.

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Moving on
UAS and Transportation Mapping

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Some typical UAS applications described in some literature are:

- Storm/Hurricane monitoring
- Parcel Delivery
- Emergency Services
- Wildfire Monitoring
- Wildlife Protection
- A Range of Agriculture Tasks
- Asset and Infrastructure Inspections
- Security
- Exploration

- Environmental Assessment
- Mass Media
- Real Estate
- Transport and Traffic Monitoring
- International Peacekeeping
- The Visual Arts
- Emergency Management
  - ☐ Response
  - ☐ Recovery
  - ☐ Mitigation.

The Use of Unmanned Aerial Systems for Steep Terrain Investigations

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Some Typical Applications of UAS

UAS Lidar

➤ UAS Lidar is available in Geospatial Market

➤ Not as mature as Traditional Photogrammetry

➤ Lidar

❑ High price tag

❑ Need low-weight Lidar Scanners

❑ Need Precise GNSS/IMU

❑ Flight time shorter due heavy payload

❑ Onboard RTK GNSS for heading and IMU for pitch and roll

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UAS Survey Grade LiDAR Sensor

Survey-Grade LiDAR for UAS from RIEGL

RIEGL Laser Measurement System has been developing what it claims to be the world's first survey-grade UAS LiDAR sensor, the VUX-1.The new sensor was designed to meet the challenges of emerging surveying solutions by UAS, gyrocopters, and ultra-light aircraft, both in measurement performance and in system integration. The VUX-1 is an ultra lightweight LiDAR sensor with less than 4 kilograms (less than 9 pounds) overall weight, that can easily be mounted onto professional UAS/RPAS.

Some Benefits of UAS Applications

- Safety of operator (pilot) & field staff
- Large area coverage (compared to ground observations)
- Long dwell times over areas of interest
- Readily available technology
- Ability to operate in hostile environments (smoke, ash, active volcano, etc.)
- Variety of platforms and sensors (mix and match)
- Relatively low costs to operate (sUAS)
- Archive of images for future use
- Puts technology in the hands of the scientists
- New observations = new science = more informed decisions

Many UAS applications described above are limited by the current civil aviation conditions. It could be argued that, without sophisticated collision avoidance, UAS development is still at a primitive stage. Research is being undertaken into collision avoidance systems. This should improve the applications of UASs and could allow them to fly within civilian airspace as well as avoid collisions with objects outside of civilian airspace, particularly when multiple UASs are being used. Furthermore, NASA in the USA is researching prototype technologies for a UAS Traffic Management (UTM) system, which includes airspace design, dynamic definition of boundaries for safe operations of UASs, congestion management and terrain avoidance that could lead to integration of airspace requirements for safe, efficient, low-altitude operations.

Typical drone surveying workflow

Flight planning

•Choose/import base map

•Highlight coverage area (rectangle/polygon)

•Set desired Ground Sampling Distance (i.e. 5 cm (2 in) / pixel)

- • Flight altitude defined automatically as a result (e.g. 5 cm/pixel = 162 m altitude using default eBee WX camera)
- • This altitude determines maximum single-flight coverage possible
- • Automatic definition of flight lines & image capture points

•Set image overlap

- • Necessary for stereo coverage

•Define safe landing zone

Setting of on-site GCPs

•For absolute X,Y, Z accuracy of down to 3 cm / 5 cm (1.2 in / 2 in)

•No GCPs required, to achieve similar accuracy, if using eBee RTK

•Optimal size & shape of GCP targets defined by GSD of imagery

Flight

•Autonomous flight

•Monitor progress/change flight plan via flight control software

•Automated landing as per defined landing zone

Import images

On-board SD card contains images and flight log (.bbx file)

Images geo-tagged according to flight log during importation

Generate Quality Report on site to verify quality and coverage

Generation of orthomosaics and 3D point clouds

Using post-flight photogrammetry software

Relative orthomosaic/3D model accuracy: 1-3x GSD

Analysis/production of deliverables

Creation of break lines, reference points, digital elevation models, contour lines

Calculation & analysis of volumes and stockpiles

Export of output files (geoTIFF, obj, dxf, shape, LAS, KML tiles etc.) to third-party software as required (see below)

Final report/deliverable creation in third-party software

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References:

http://www.spar3d.com/blogs/measuring-the-value/coming-array-based-lidar-uav-survey/
http://www.fdot.gov/aviation/uas.shtmhttps://support.dronedeploy.com/docs/volume-measurement
https://support.dronedeploy.com/docs/working-gcp-step-by-step
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http://federaldroneregistration.com/
https://www.faa.gov/uas/
http://catstest.com/
https://www.faa.gov/training_testing/testing/media/testing_matrix.pdf
https://www.youtube.com/watch?v=-JgU4QuqeVw(you tube)
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xpsEQW0D5OZ6x8QEsDK&q=picture+of+captain+a.g.+lamplugh&simid=608011639385623342&sel
ectedIndex=0&qpvt=picture+of+captain+a.g.+lamplugh&ajaxhist=0

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